Public Comments on the PM NAAQS: Particulate Matter Urban-Focused Visibility Assessment Second External Review Draft

Comments to CASAC
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Urban VAQ: What Meets the Eye is More Complex than Extinction Measured at a Single Site and Wavelength

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Faults in UFVA Measure of UAQ

- UVAQ is due to many factors beside 550 nm extinction
  - Urban VAQ requires consideration of wavelength-dependent extinction which leads to discoloration
    - Uniform extinction reduces visual range (e.g., Class I areas)
    - Wavelength-dependent extinction associated with NO_2 and ultra-fine carbonaceous particulate cause discoloration
  - Hourly point extinction measurements are too variable to properly characterize UVAQ
    - Integration over the line of sights in different directions require either path-integrated or multiple point measurements
    - Four-hour averages would better reflect the time scales in which how meteorology and PM components interact to affect UVAQ

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Urban VAQ Preference Studies Are Not Definitive

- UFVA previously acknowledged incomplete and flawed studies:

  "Additional studies, including directly comparable studies using similar methods in diverse cities, are necessary to gain further understanding of preferences for urban visibility" (page 2-26 of External Review Draft)

- Wide range of "acceptable" extinction identified
  - Study methods vary among and within a given urban region
  - strong evidence that study design influences results
  - strong and profound inter-regional differences in VAQ perception
  - view of computer-generated photographs of simulated extinction levels does not adequately simulate visual experience as it relates to welfare

- Because studies are flawed and inconclusive, additional studies needed before an NAAQS for VAQ can be established

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24-hour $PM_{2.5}$ Mass Not a Surrogate for UVAQ

- $PM_{2.5}$ mass consists of consists of a large number of species with a range of optical properties
- Contributions vary daily with weather patterns, upwind source regions and season
- The way extinction increases with humidity vary widely among species
- Measurements need to be averaged over a number of sites in an urban area rather than a single site which is affected by local sources of primary $PM_{2.5}$
- Natural interferences (sea salt, wildfires, snow, rain, fog, etc.) need to be addressed

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Overall Summary of Comments

- There is no definitive “acceptable” extinction level upon which to base a VAQ NAAQS for all urban areas
- Extinction at only one visible wavelength and based only on $PM_{2.5}$ mass cannot be used as a definitive indicator of VAQ
- Particle mass - extinction relationship is highly complex
  - also depends on particle number, size, species, humidity
  - all of these highly variable over space and time
- Difficulty to regulate visibility with a single ambient standard is illustrated by the Regional Haze Program, which takes a more flexible, site-specific approach
- Due to these issues, it is inappropriate to establish a mass-based secondary $PM_{2.5}$ NAAQS to address urban VAQ

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